Planning Community of Practice
Crowne Plaza Hotel
San Antonio, TX
21 May 2008

AFC Theme 2
Risk Informed Decision Making

David Moser, PhD
Lead, USACE Actions for Change Theme 2:
Risk Informed Decision Making
david.a.moser@usace.army.mil

ACTIONS for CHANGE

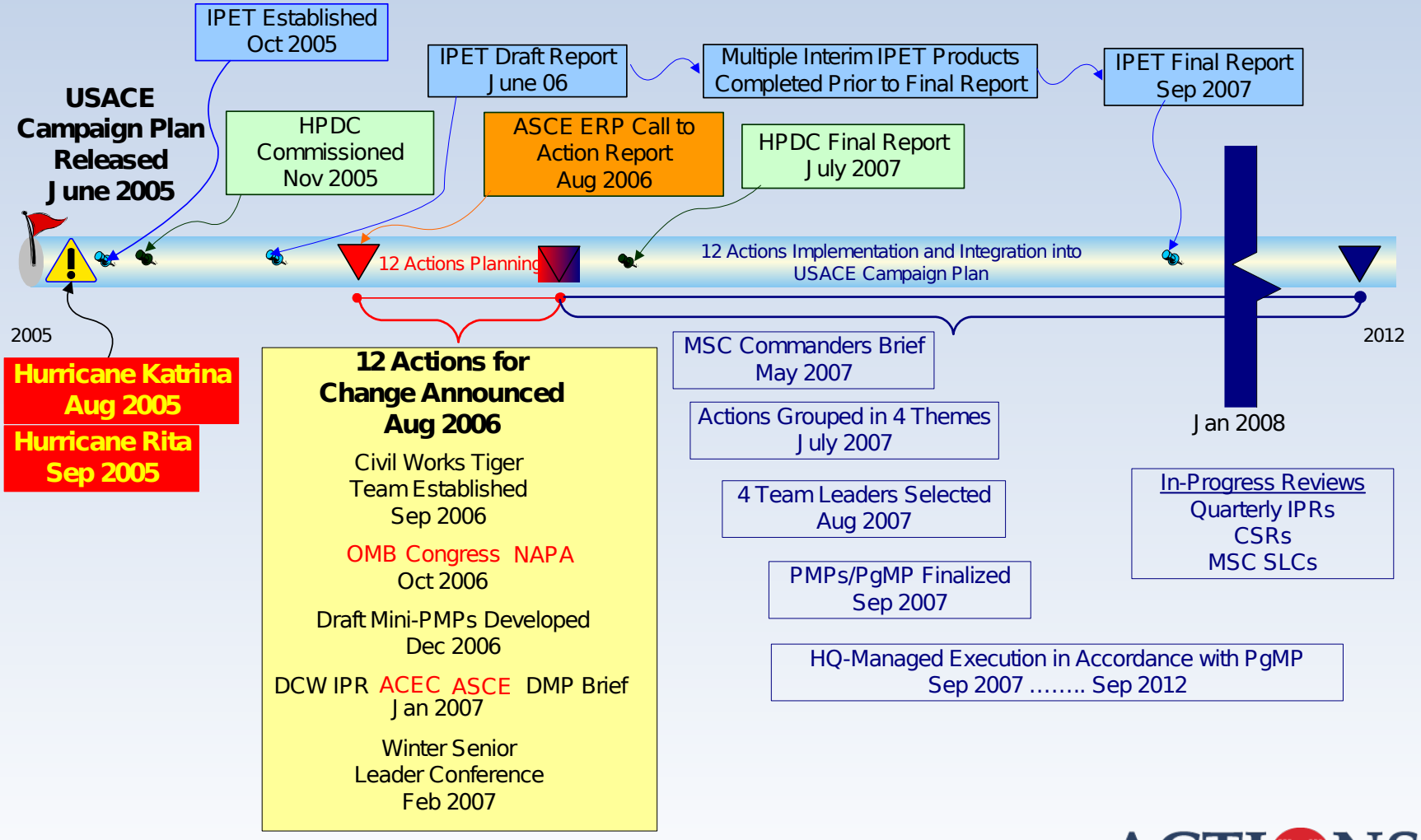
Goal of Actions for Change

The Actions for Change program has two major goals:

- *improve public safety*
- *improve the Corps' water resources infrastructure*

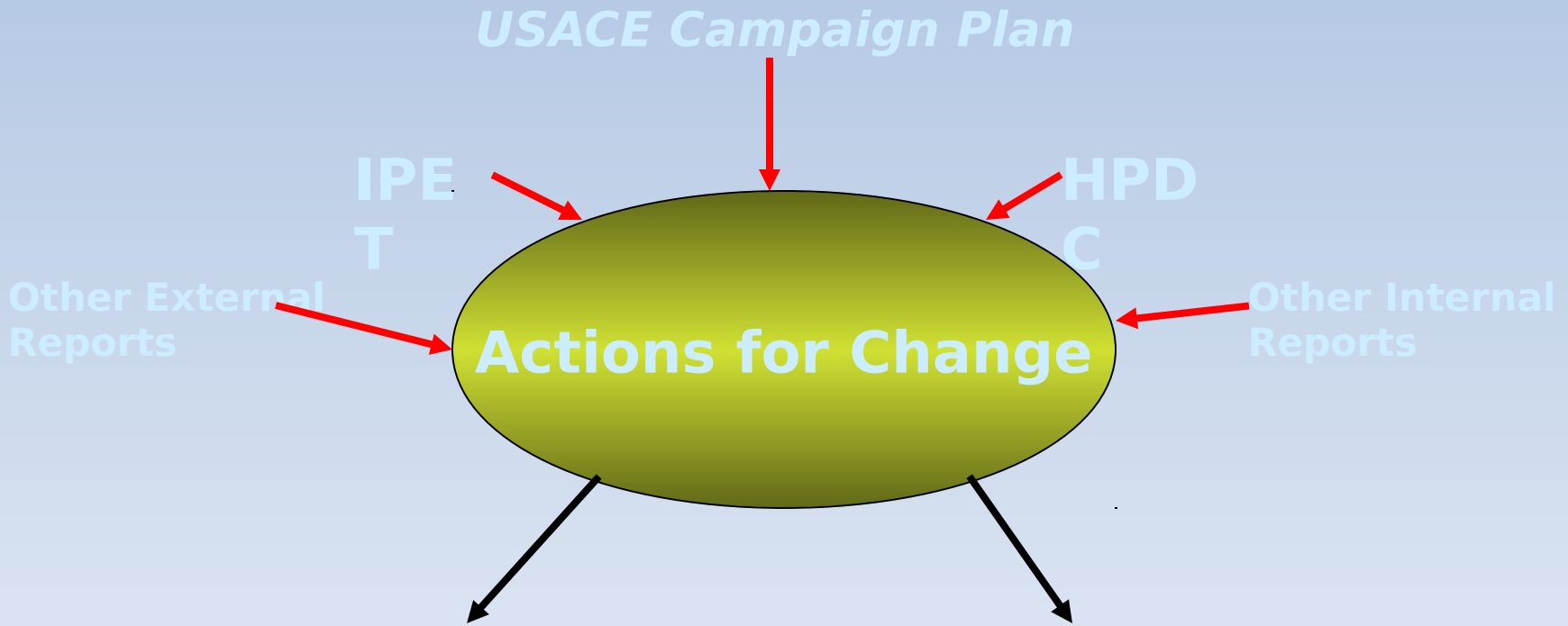
ACTIONS for CHANGE

Civil Works TIMELINE
Actions for Change



All stressed that we must demonstrate our commitment to change.

ACTIONS for CHANGE



1 Comprehensive Systems Approach

Actions 1,5,6

3 Communication of Risk to the Public

Actions 9,10

2 Risk Informed Decision Making

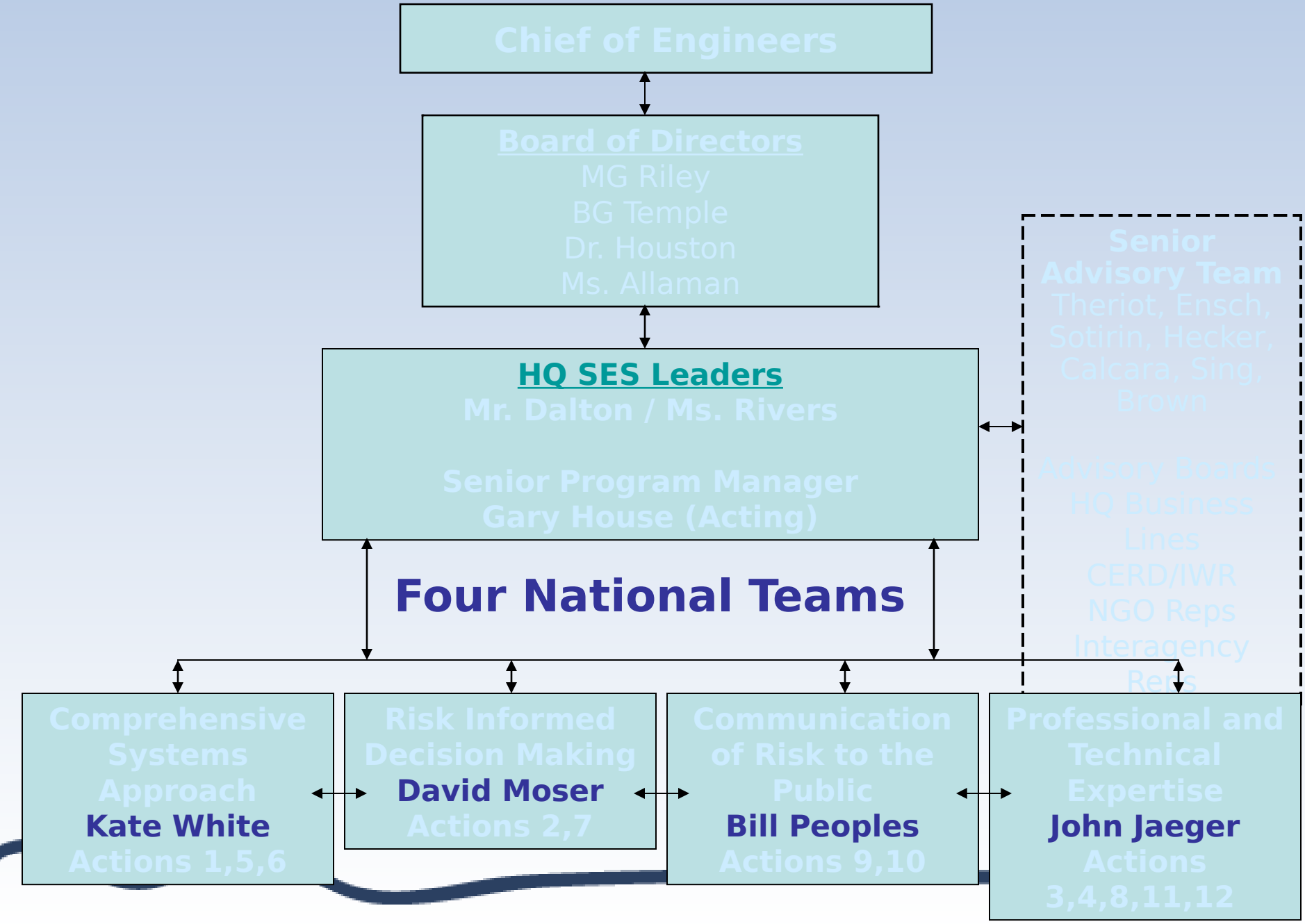
Actions 2,7

4 Professional and Technical Expertise

Actions 3,4,8,11,12

ACTIONS for CHANGE

Actions for Change Team Structure



Theme 2 Team

- Lead: David Moser, PhD, Chief Economist, USACE
- Todd Bridges, PhD, Senior Scientist for Environmental Sciences, ERDC
- Brian Harper, Senior Economist, IWR
- Boni Bigornia, CESPD, (former member)
- Doug Clemetson, P.E., Chief, Hydrology Section, CENWO
- Dennis Hughes, P.E., Resident Engineer, Marmet Resident Office, CELRH
- Beth Faber, PhD, Hydraulic Engineer, HEC
- Ex Officio
- Anjana Chudgar, CECW-CE
- Jeff Jensen, CECW-HS

Theme 2
Risk Informed Decision Making

- Theme 2 emphasizes integrated risk management

- USACE will use risk and reliability concepts in planning, design, construction, operations and major maintenance and to improve its review of completed works program

Risk Informed Decision Making

Infuse risk assessment and risk management into the life-cycle of a CW project

- Recognize all risks
  - property, people, economy, environment, and cultural impacts
- Acknowledge uncertai
- Collaborate with stakeholders throughc

for CHANGE

Risk Defined

- Risk is:
  - likelihood and intensity of adverse outcomes
  - typically measured as potential loss-of-life, property damage, and/or ecosystem losses

$$\text{Risk} = f\ (\text{Hazard, Consequence, Probability})$$

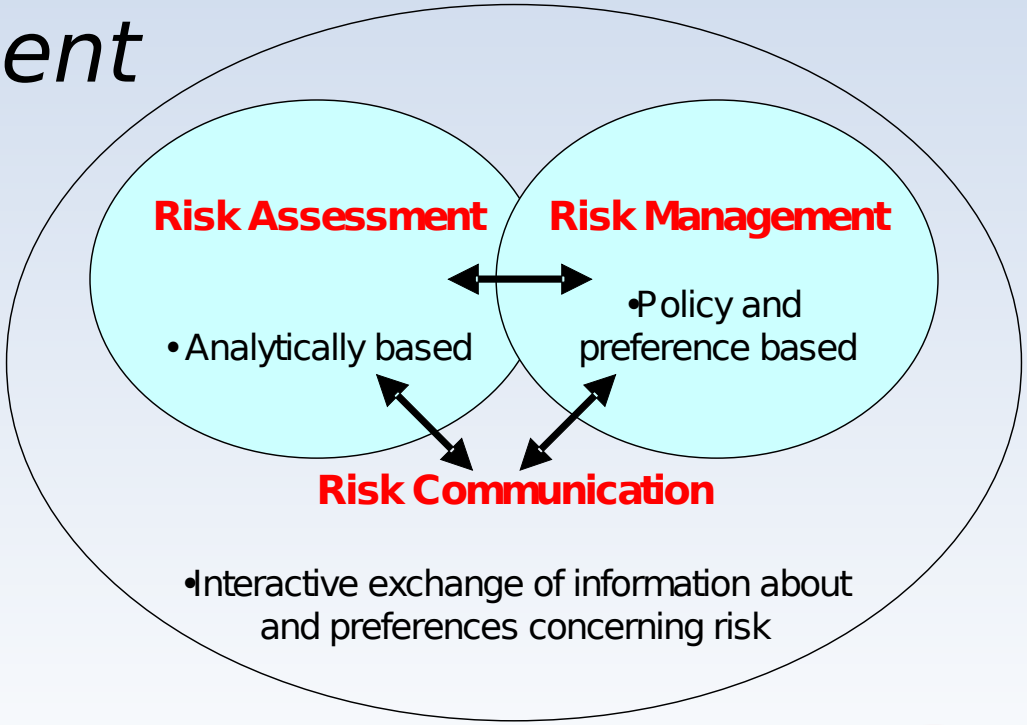
ACTIONS for CHANGE

Uncertainty Defined

- Uncertainty is:
  - the inherent randomness of the natural and social systems
    - inherent or natural variability
    - aleatory uncertainty
  - a by-product of analysts' necessary reliance on limited data and on models
    - knowledge uncertainty
    - epistemic uncertainty

Risk Analysis

- *Tasks organized around risk analysis framework with focus on assessment and management*



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Risk Assessment

- Answers the following questions:
  1. What can go wrong?
  2. How can it happen?
  3. What is the likelihood?
  4. What are the consequences?

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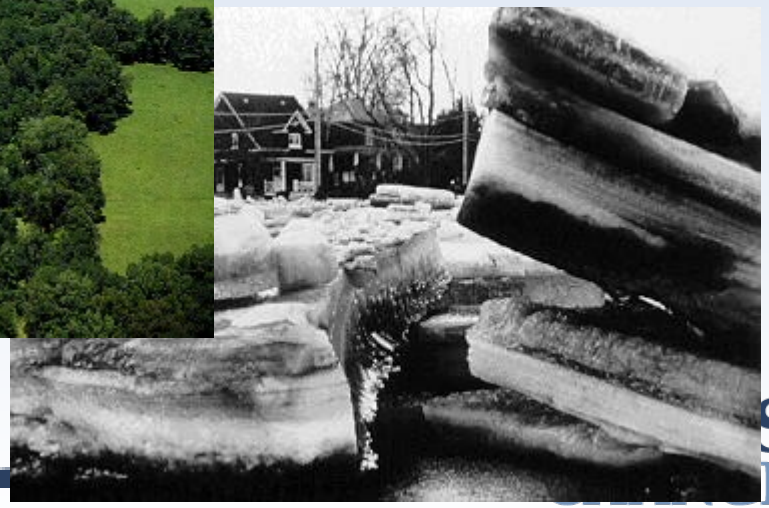
Assess Risks



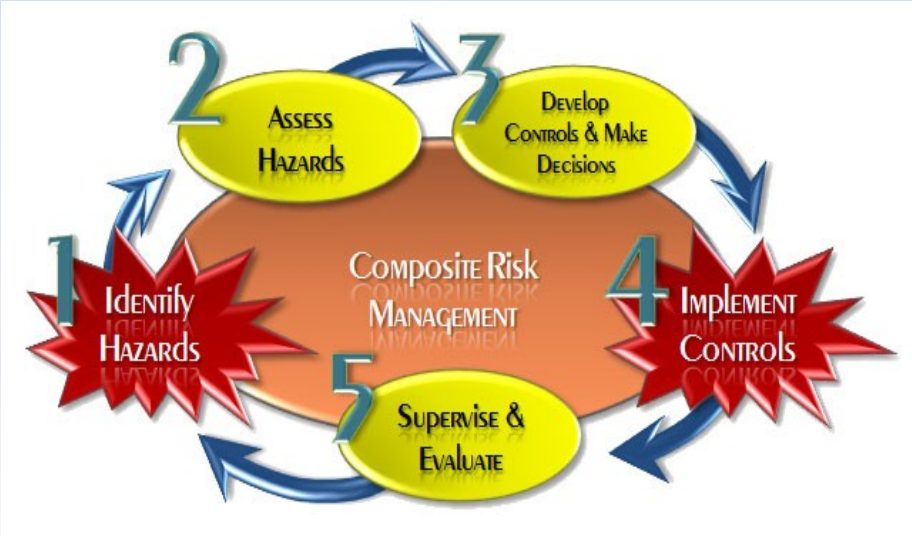
Risk sources may be natural or man-made

Risk Management

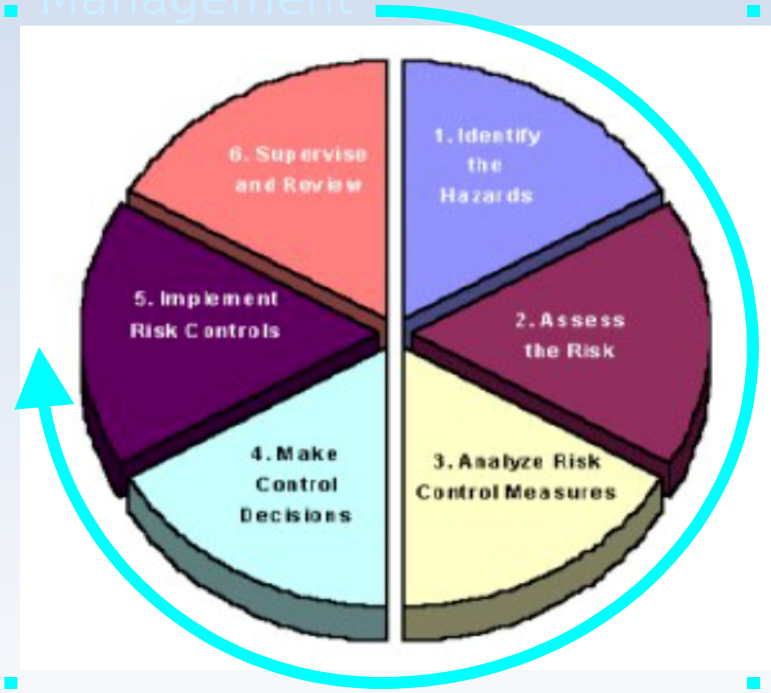
- The process of identifying the problem and taking action to alter levels of risk
- RM process:
  - identify options,
  - evaluate and compare,
  - select,
  - implement,
  - monitor, and
  - adaptively manage

Risk Management Process in US Military

Army, Composite Risk Management (CRM)



USAF, USN Operational Risk Management


6. Supervise and Review
1. Identify the Hazards
5. Implement Risk Controls
2. Assess the Risk
4. Make Control Decisions
3. Analyze Risk Control Measures

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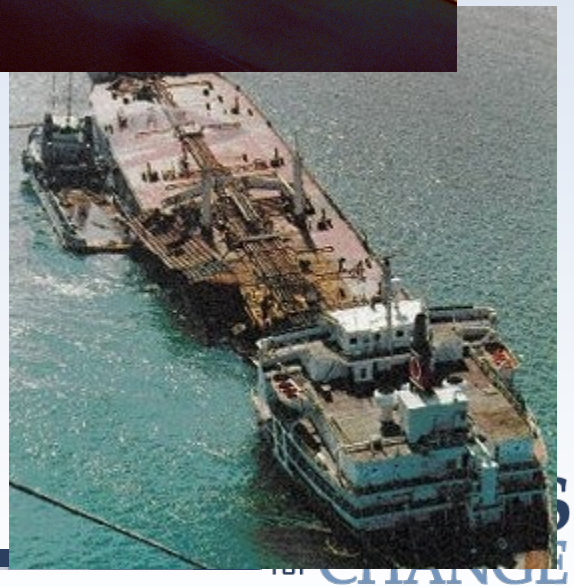
Manage Risks

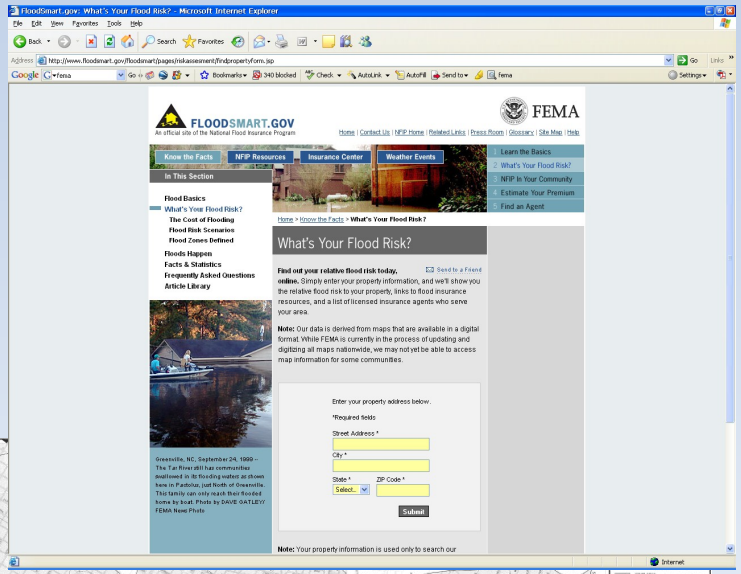
There are good outcomes from risk management, but not always.

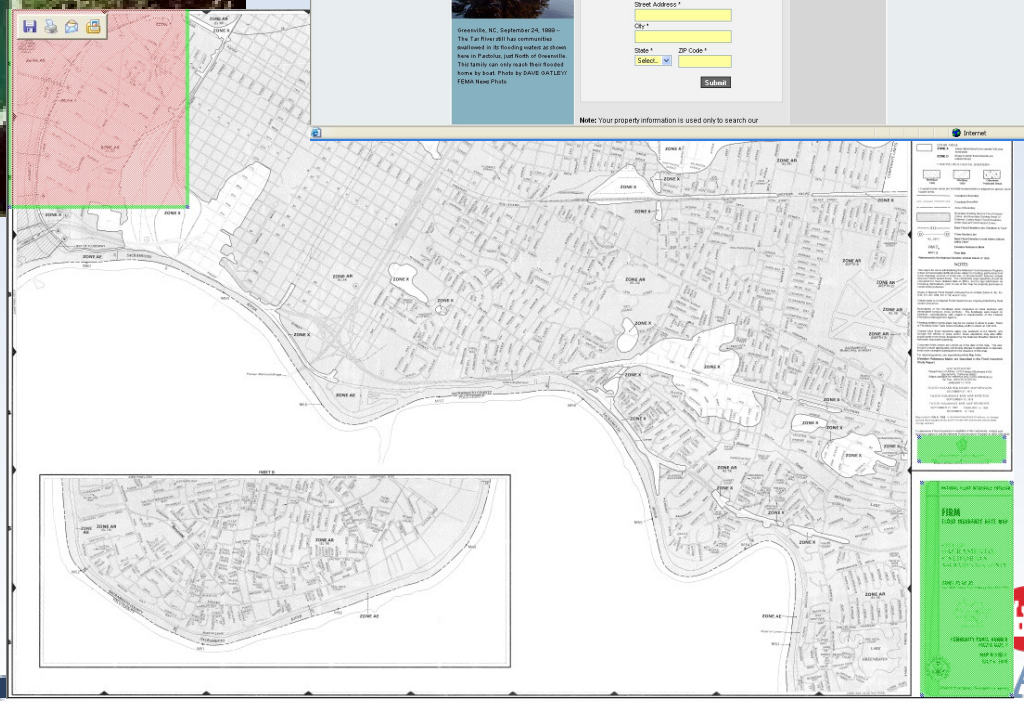


Risk Communication

- The open, two-way exchange of information and opinion about hazards and risks leading to a better understanding of the risks and better risk management decisions. Risk communication answers the following questions for a risk management activity:
  - Why are we communicating?
  - Who is our audience?
  - What do we want to learn from our audience?
  - What do they want to know?
  - What do we want to get across?
  - How will we communicate?
  - How will we listen?
  - How will we respond?

Communicate Risks



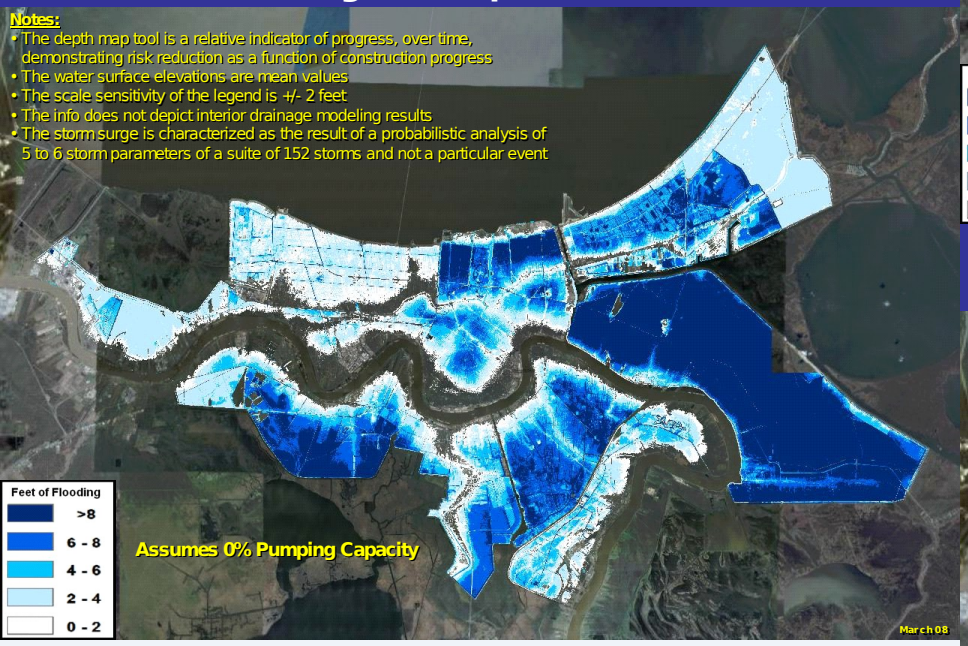


Inform or change behavior?

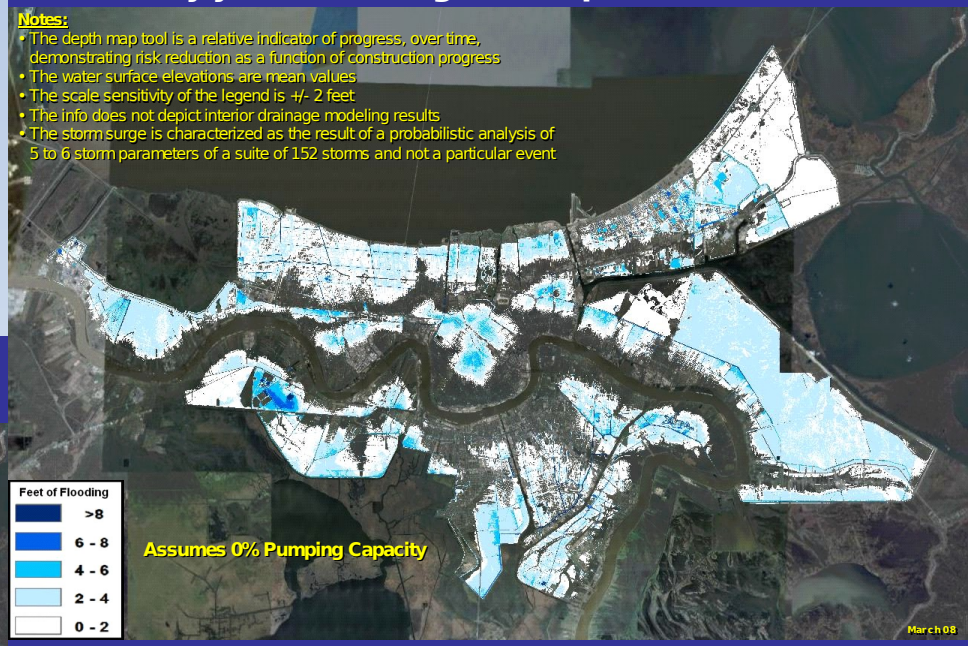
Communicating Risk
TFH

What is the message?

Before Katrina, you had a 1% chance every year of flooding this deep from Hurricanes


Notes:
• The depth map tool is a relative indicator of progress, over time, demonstrating risk reduction as a function of construction progress
• The water surface elevations are mean values
• The scale sensitivity of the legend is +/- 2 feet
• The info does not depict interior drainage modeling results
• The storm surge is characterized as the result of a probabilistic analysis of 5 to 6 storm parameters of a suite of 152 storms and not a particular event
Feet of Flooding
>8
6 - 8
4 - 6
2 - 4
0 - 2
Assumes 0% Pumping Capacity
March 08

With the 100-year level of protection, you have a 1% chance every year of flooding this deep from Hurricanes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Theme 2 Program Overview

Action 2: Risk Analysis Concepts, Models, and Tools
2A-B: Development of Flood Risk Management Tools
2C: Life-Cycle Risk Analysis Framework
2E: Risk Technology Workshops
Action 3: Policy, Guidance & Standards
3A: Levee Certification
3D: Tolerable Risk Policy
Action 7: Completed Works
7A, C-E: Levee Methodology, Policy & Procedures
7B: Reassess Levee Failure Mechanisms Based on IPET
Action 12: Research
12E: Infrastructure Risk & Reliability Models
12F: Stage & Flow Frequency Limits
12G: Coastal Storm & Ecosystem Effects Integration
2D: Engineering Model for Hurricanes

ACTIONS for CHANGE

Action 2: Risk Analysis Concepts, Models & Tools

- 2A-B: Development of Flood Risk Management Tools
  - White paper recommending the basic design parameters of HEC-FDA 3.0 June 2008
  - Workshop with the dam and levee safety methodology team on HEC-FDA 3.0 and their model June 2008
- 2C: Life-Cycle Risk Analysis Framework
  - Executive session on Risk management for HQ 11 July 2008
  - Risk informed planning white paper—July 2008
  - Risk management for civil works white paper—August 2008
  - National workshop on risk informed decision making—Nov 2008 (ASCE sponsored AFC supported)
- 2E: Risk Technology Workshops
  - Risk Analysis workshops – hold 3 workshops at different Districts or MSC's by end of calendar year

Action 3: Policy, Guidance and Standards

- 3D: Tolerable Risk Policy
  - Interim tolerable risk policy for dam safety—Draft completed July 2008

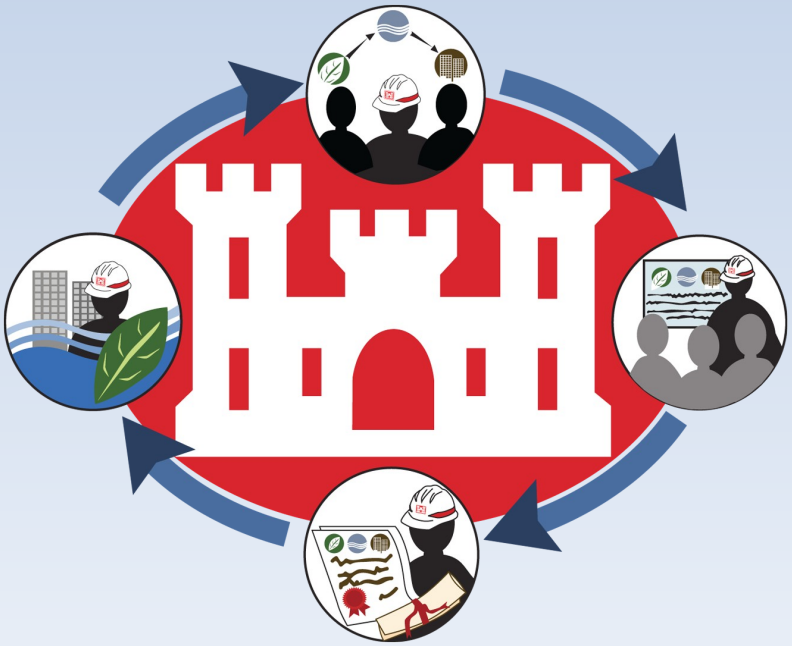
Action 7: Completed Works

- Develop Interim risk reduction ETL for levees—Jul 2008
- Numerical model for I-wall failure—Nov 2008

Observations on AFC

- Observations
  - Other activities influential on AFC Theme 2
    - P&G revision directed by WRDA 2007
    - Dam safety and levee safety
      - Policy, procedures and methodologies
    - GI R&D Program
  - Other programs have most of the $
    - Implies AFC activities more in coordination and championing tasks than funding
    - Need to leverage limited AFC funds
    - Program management structure may need to be revisited to acknowledge changed roles of Theme PDT's

Questions?



To learn more about Actions for Change
visit us on the web at
https://maps.crrel.usace.army.mil/AFC/

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